AMENDMENTS TO THE CLAIMS

The listing of claims below replaces all prior versions of claims in the application.

1-13. (Cancelled)

14. (Currently Amended): A method of optimizing ion distribution of ion position and velocity and extracting ions from a linear ion trap to time-of-flight mass spectrometer, said ion trap being driven by a set of digital switches, said method comprising the following steps:

trapping said ions in said ion trap by applying trapping voltages having waveform created by fast switching of the application on electrodes of said ion trap between discrete positive and negative DC levels in a short switching period;

cooling said trapped ions by collisions with a buffer gas down to equilibrium; and

extracting the trapped ions in said ion trap to said time-of-flight mass spectrometer by applying extracting levels on the electrodes of said ion trap under conditions, where ~~said discrete DC levels applied on~~ at least one pair of the ~~electrode~~ electrodes are kept at a constant~~, until all the trapped ions are extracted~~ value of positive or negative DC level over a period which is longer than said switching period.

15. (Currently Amended): A method of extracting ions from a linear ion trap as claimed in claim 14, where [[said]] a set of trapping states defined by the discrete positive and negative

DC levels applied on the electrodes of said ion trap in said trapping step consists of two states, each of said states lasts for half of [[a set]] said short switching period.

16. (Previously Presented): A method of extracting ions from a linear ion trap as claimed in claim 14, wherein said buffer gas fills said ion trap at pressures in the range from 0.01mTorr to lmTorr.

17. (Currently Amended): A method of extracting ions from a linear ion trap as claimed in claim 15, wherein said [[set]] short switching period is in the range from 0.3 micro seconds to 1.0 micro seconds.

18. (Currently Amended): A method of extracting ions from a linear ion trap as claimed in claim 15, where the final trapping state prior to said ejection state has a duration of approximately one quarter of said [[set]] short switching period.

19-20. (Cancelled)

21. (Previously Presented): A method of extracting ions from a linear ion trap as claimed in claim 14, wherein an opposite pair of electrodes (Y pair) of said set of electrodes is connected to a first subset of said digital switches capable of switching at a repetition rate, and at least one of another oppositely positioned pair of electrodes (X pair) of said set of electrodes is

connected to a second subset of said number of said digital switches which has a higher voltage rating, said second subset of digital switches connects DC voltage supply to said X electrodes for election of said ions.

22. (Previously Presented): A method of extracting ions from a linear ion trap as claimed in claim 21, wherein said first subset of said number of said digital switches includes 2 serially linked high repetition switches, switching between a positive and negative voltage to provide said Y pair of electrodes of said electrodes with a rectangular waveform.